NATURAL BRIDGES NATIONAL MONUMENT
2005 Research Permits

1) Permit #: NABR-2005-SCI-0001

Study Title:
HERBARIUM AND FIELD STUDIES OF VASCULAR PLANT FLORA OF NABR FOR NATIONAL PARK SERVICE INVENTORY AND MONITORING PROGRAM

Primary investigator contact information:

Name: Walter Fertig
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Project Summary:
The purpose of this study is to document the vascular plant flora of Natural Bridges National Monument (NABR) and develop a plant distribution database using the National Park Service's NPSpecies system.

2005 Findings and Status:
As a preliminary step in developing an updated species list and distribution database for the park, I examined all specimens in the Natural Bridges NM herbarium to correct misidentifications, update species nomenclature (following Welsh et al. 2003, "A Utah Flora, third edition"), and add variety or subspecies names if needed. Of the 449 specimens currently deposited in the collection (not including 396 specimens out on loan) 10 were misidentified (2.2%), 38 had their names updated (8.5%), 34 had variety names added (7.6%), and 367 were confirmed as correctly identified (81.7%). The Natural Bridges NM herbarium currently contains 208 vascular plant taxa collected within the monument. Sixteen additional species have been documented for Natural Bridges based on collections at other herbaria and another 181 taxa are reported for the park (without vouchers) by Schelz and Moran (2005 SE Utah Group Plant list) and Welsh and Moore(1968 "Plants of Natural Bridges National Monument", Proceedings Utah Academy Sciences 45:220-248). Based on the Atlas of the Utah Flora (Albee et al. 1988), 309 additional species are reported from comparable habitats in the vicinity of Natural Bridges, but have not yet been documented within the monument. These results suggest that the Natural Bridges NM herbarium is missing between 49-60% of the plant taxa known or likely to occur in the park. In particular, fall-flowering, non-native, and wetland taxa appear to be under-represented. Targeted inventory work to fill gaps in the Natural Bridges NM vascular plant collection is recommended so that park manager's will have an improved understanding of the composition and status of the flora of the park and a more complete reference collection for researchers and staff interested in plant identification.

2) Permit #: NABR-2005-SCI-0002

Study Title:

NORTHERN AND SOUTHERN COLORADO PLATEAU NPS SPRINGS ECOSYSTEMS INVENTORY

Primary investigator contact information:

Name: Dr. Abraham Springer, Northern Arizona University
Address: P.O. Box 4099, Flagstaff, AZ 86011
Phone: 928.523.7198 **Email:** abe.springer@NAU.EDU

Project Summary:
As part of the joint Northern and Southern Colorado Plateau Parks Networks collaboration on springs ecosystems, we are conducting a comprehensive physical and biological inventory of springs ecosystems on NPS units on the Colorado Plateau. This project will be conducted by staff from Northern Arizona University, Flagstaff, Arizona with funds from the National Park Service (Cooperative Agreement Number: CA 1200-99-009, attached below). We would like to conduct an inventory of several springs on your NPS unit to test our methods and provide you with information on the ecological condition of your springs.

This inventory will be conducted by Abraham Springer and Lawrence Stevens of the Geology Department at Northern Arizona University, and their assistants. These two researchers recently produced a springs ecosystem conceptual model, a comprehensive springs classification system, and a suite of springs inventory protocols that we are testing for further use in assessing the health of springs ecosystems. Their curriculum vitae are available upon request.

These inventories will require approximately one half day / site, and will involve mapping the site and its vegetation, and collecting water, soil, and biological specimens (especially plants and invertebrates). We have extensive experience inventorying springs ecosystems on National Park lands in Grand Canyon, Lake Mead National Recreation Area, Glen Canyon National Recreation Area, and other NPS lands. Through this experience, we have learned how to minimize researcher impacts on these delicate ecosystems, and we will use that knowledge to make sure we minimize our impacts to the sites visited.

The study sites will include those that best represent the variety of springs habitats on your NPS land unit. Selection criteria include diverse settings, elevations, and water chemistries, and the sites inventories will hopefully include both pristine and human altered sites. Your staff may have recently provided a list of candidate springs for this analysis, and we will follow up on that site selection by personally contacting the appropriate staff to better understand the timing and access to the sites. We are providing a comprehensive list of study sites in this permit application, which will be refined once we discuss priority and access with appropriate NPS staff and confirm the collection dates. The data collected will be incorporated into a newly created comprehensive NPS database and the researcher's classification system. Data will be provided back to your NPS unit for your information and use.

The draft protocols to be used during the springs inventories are attached. The Northern and Southern Colorado Plateau networks are jointly developing a database into which the data will be compiled. Specimens collected through this project will be sacrificed for analysis (e.g., water quality samples), or prepared and housed at the Museum of Northern Arizona in Flagstaff, an approved NPS repository.

2005 Findings and Status:
During 2005, 75 springs were inventoried in 26 units of the National Park Service for the Northern and Southern Colorado Plateau Inventory and Monitoring Network. The inventories included site descriptions, environmental and climate conditions, vegetation and invertebrate surveys, wildlife observations, water-quality analyses, geomorphology descriptions, and water-quantity measurements. We inventoried Kachina Alcove Spring and Kachina Bridge Spring at Natural Bridges NM. A final project report to be submitted to the I&M Network in spring 2006 will include a summary of the inventories of these springs.

3) Permit #: NABR-2005-SCI-0003

Study Title:

SOIL SURVEY OF NATURAL BRIDGES NATIONAL MONUMENT

Primary investigator contact information:

Name: Mr Victor Parslow, USDA Natural Resources Conservation Service
Address: 340 North 600 East, Richfield, UT 84701.
Phone: 435.896.6441 ext. 134 **Email:** Vic.Parslow@ut.usda.gov

Project Summary:

To provide an updated soil and ecological site inventory for Natural Bridges National Monument (NABR), that meets National Cooperative Soil Survey (NCSS) standards and park management and planning needs.

The existing soil survey was conducted in the late 1970s's and the early 1980's as part of the San Juan County, Utah, Central Part soil survey. This inventory was primarily designed as a tool for use in managing grazing lands and has been found to be too general to be useful in ------ managing the park. Information is insufficient to model salt movement, mitigate visitor impacts, identify and protect habitat of Threatened and Endangered species, and other park responsibilities.

In 2003, reprensentatives of the National Park Service approached the Natural Resources Conservation Service to update the existing soil surveys within Arches and Canyonlands National Parks and Natural Bridges and Hovenweep National Monuments. The Plan of Work and contracted were approved in 2004. This application is seeking permission to carry out the field work necessary to complete the contract.

Findings and Status:

The Natural Resources Conservation Service (NRCS) completed the majority of the field work for providing an updated soil and ecological site inventory for Natural Bridges National Monument in 2005. A summary of the activities for the year follows:

Soil inventory activities

2005 Results and Activities:

Pre-survey activities were conducted in Natural Bridges National Park, as well as data collection on soils and plants.

Pre-survey activities included reconnaissance of the park, and evaluation of the existing Soil Survey and Ecological Site Descriptions (ESD's) to be updated. Relationships between the geology and associated soils were researched, and theories on soil-geology-plant-landscape models were developed.

Materials were gathered to be used in the inventory, such as aerial photographs, topographic maps, and various GIS coverages which were developed into a geodatabase.
Soil survey and plant inventory field equipment was obtained, and the appropriate personnel were hired for the project, including a soil scientist, range conservationist, and archaeologist. After pre-survey preparation was complete, a field soil survey was conducted in Natural Bridges National Monument, which consisted of more 50 full soil profile descriptions, and accompanying plant composition and production data. Ecological Site Descriptions (ESD's), and state and transition models will be developed from the vegetation data gathered. From these various

observations, soil map units were developed, and transects were conducted on these map units to document their composition. Maps are presently being produced for the 7,636 acres surveyed; showing the spatial extent and location of these map units, as well as the points where supporting documentation was gathered. All data will be provided to Natural Bridges National Monument, as well as other soil survey products as they are developed and become available.

4) Permit #: NABR-2005-SCI-0004

Study Title:

VERTEBRATE SPECIES IN UTAH NATIONAL PARKS

Primary investigator contact information:

Name: Mr George Oliver, Utah Natural Heritage Program
Address: Utah Division of Wildlife Resources, 1594 W. North Temple, Salt Lake City, UT 84116-3154
Phone: 801-538-4820 **Email:** georgeoliver@utah.gov

Project Summary:

The principal purpose of this research is to increase basic knowledge and understanding of biological inventories with specific vertebrate species verification. This is one component of the biological inventories being conducted within the units of the NCPN as part of a national emphasis on inventory and monitoring within the National Park Service. Species verification will benefit the NPS and UDWR and the entire scientific community through updated information housed in the Automated National Catalog System (ANCS+), the NPS national biodiversity database, NPSpecies, and the UDWR state biodiversity database.

The purpose of the biological inventories is to document 90 percent of the vascular plant and vertebrate animal species in the units of the NCPN. Data collected from these inventories are incorporated into the national bio-diversity database, NPSpecies. In order to verify the existence of a species in a park unit, the NCPN requires a voucher specimen, a photograph, or an authoritative observation for each species listed in the database.

Species verification may be obtained from a number of sources such as NCPN inventories; existing voucher data housed in the ANCS+; from data mining efforts at other museums and herbaria; and from review of technical reports and publications. The taxonomic nomenclature associated with these verification sources is often outdated or incorrect; for example, museums may mistakenly list a particular species as collected from a Utah park, leaving the verification process in question. Once all sources have been reviewed, there are often gaps remaining in the species verification process which need to be filled.

The NPS and UDWR agree to work cooperatively toward obtaining voucher, photographic or observational data for the herpetofauna, mammalian, and avian species currently lacking complete information, and to standardize the taxonomic nomenclature for all species in the Utah units of the NCPN.

2005 Findings and Status:
Preliminary work focused on amphibians and reptiles. Three species of amphibians and ten species of reptiles were documented with precise geographic locations, and ecological data for these were obtained.

5) Permit #: NABR-2005-SCI-0005

Study Title:

Sound Levels in Natural Bridges National Monument

Primary investigator contact information:

Name: Skip Ambrose,
Address: HC 64 Box 2205 Castle Valley, UT 84532
Phone: 435-259-0401 or 970.227.8154 **Email:** skipambrose@frontiernet.net

Project Summary:

To determine natural ambient sound levels in the primary vegetation types in NABR, and the relative influence of human-caused sounds on natural sound levels.

The only collections will be the collection of recorded sound data.

The National Park Service (NPS) is concerned with degradation of natural soundscapes in units of the National Park system. NPS Management Policies (4:9; 2001) states: "The National Park Service will preserve, to the greatest extent possible, the natural soundscapes of parks. Natural soundscapes exist in the absence of human-caused sound. The natural soundscape is the aggregate of all natural sounds that occur in parks, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive, and can be transmitted through air, water, or solid materials."

"Using appropriate management planning, superintendents will identify what levels of human-caused sound can be accepted within the management purposes of the parks. The frequencies, magnitudes, and durations of human-caused sound considered acceptable will vary throughout the park, being generally greater in developed areas and generally lesser in undeveloped areas. In and adjacent to parks, the Service will monitor human activities that generate noise that adversely affects park soundscapes, including noise caused by mechanical or electronic devices. The Service will take action to prevent or minimize all noise that, through frequency, magnitude, or duration, adversely affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified as being acceptable to, or appropriate for, visitor uses at the sites being monitored" (NPS 2001).

OBJECTIVES

1. Determine natural ambient sound levels in the primary habitats/acoustic zones in Natural Bridges National Monument, during the summer and winter seasons; and

2. Assess the influence of man-made noise on natural ambient sound levels.

The primary objective of this project is to provide basic acoustic data necessary for preparation of a Soundscape Management Plan for Natural Bridges National Monument. A secondary objective is to collect acoustic data which will be useful in assessing the influence of man-made noise on natural sounds.

HOVENWEEP NATIONAL MONUMENT
2005 Research Permits

1) Permit #: HOVE-2005-SCI-0001

Study Title:

NORTHERN AND SOUTHERN COLORADO PLATEAU NPS SPRINGS ECOSYSTEMS INVENTORY

Primary investigator contact information:

Name: Dr. Abraham Springer, Northern Arizona University
Address: P.O. Box 4099, Flagstaff, AZ 86011
Phone: 928.523.7198 **Email:** abe.springer@NAU.EDU

Project Summary:
As part of the joint Northern and Southern Colorado Plateau Parks Networks collaboration on springs ecosystems, we are conducting a comprehensive physical and biological inventory of springs ecosystems on NPS units on the Colorado Plateau. This project will be conducted by staff from Northern Arizona University, Flagstaff, Arizona with funds from the National Park Service (Cooperative Agreement Number: CA 1200-99-009, attached below). We would like to conduct an inventory of several springs on your NPS unit to test our methods and provide you with information on the ecological condition of your springs.

This inventory will be conducted by Abraham Springer and Lawrence Stevens of the Geology Department at Northern Arizona University, and their assistants. These two researchers recently produced a springs ecosystem conceptual model, a comprehensive springs classification system, and a suite of springs inventory protocols that we are testing for further use in assessing the health of springs ecosystems. Their curriculum vitae are available upon request.

These inventories will require approximately one half day / site, and will involve mapping the site and its vegetation, and collecting water, soil, and biological specimens (especially plants and invertebrates). We have extensive experience inventorying springs ecosystems on National Park lands in Grand Canyon, Lake Mead National Recreation Area, Glen Canyon National Recreation Area, and other NPS lands. Through this experience, we have learned how to minimize researcher impacts on these delicate ecosystems, and we will use that knowledge to make sure we minimize our impacts to the sites visited.

The study sites will include those that best represent the variety of springs habitats on your NPS land unit. Selection criteria include diverse settings, elevations, and water chemistries, and the sites inventories will hopefully include both pristine and human altered sites. Your staff may have recently provided a list of candidate springs for this analysis, and we will follow up on that site selection by personally contacting the appropriate staff to better understand the timing and access to the sites. We are providing a comprehensive list of study sites in this permit application, which will be refined once we discuss priority and access with appropriate NPS staff

and confirm the collection dates. The data collected will be incorporated into a newly created comprehensive NPS database and the researcher's classification system. Data will be provided back to your NPS unit for your information and use.

The draft protocols to be used during the springs inventories are attached. The Northern and Southern Colorado Plateau networks are jointly developing a database into which the data will be compiled. Specimens collected through this project will be sacrificed for analysis (e.g., water quality samples), or prepared and housed at the Museum of Northern Arizona in Flagstaff, an approved NPS repository.

2005 Findings and Status:
During 2005, 75 springs were inventoried in 26 units of the National Park Service for the Northern and Southern Colorado Plateau Inventory and Monitoring Network. The inventories included site descriptions, environmental and climate conditions, vegetation and invertebrate surveys, wildlife observations, water-quality analyses, geomorphology descriptions, and water-quantity measurements. We inventoried Goodman Point Stream and Square Tower Spring at Hovenweep NM. A final project report to be submitted to the I&M Network in spring 2006 will include a summary of the inventories of these springs.

2) Permit #: HOVE-2005-SCI-0002

Study Title:

SOIL SURVEY OF HOVENWEEP NATIONAL MONUMENT

Primary investigator contact information:

Name: Mr Victor Parslow, USDA Natural Resources Conservation Service
Address: 340 North 600 East, Richfield, UT 84701.
Phone: 435.896.6441 ext. 134 **Email:** Vic.Parslow@ut.usda.gov

Project Summary:
To provide an updated soil and ecological site inventory for Hovenweep National Monument that meets National Cooperative Soil Survey (NCSS) standards and park management and planning needs.

The existing soil surveys were conducted in the 1970s's and the early 1980's as part of the Henry Mountains, San Juan County, Central Part, and the San Juan County, Navajo Indian Reservation, Utah soil surveys. These inventories were primarily designed as a tool for use in managing grazing lands and have been found to be too general to be useful in managing the park. Information is insufficient to model salt movement, mitigate visitor impacts, identify and protect habitat of Threatened and Endangered species, and other park responsibilities. The parts of the Hovenweep NM in Colorado were mapped in the Cortez Area, Colorado soil survey which is of more recent vintage and more detailed than the older surveys. It is anticipated that less field work will be required in this area than on the Utah side. Ecological site descriptions will be correlated to a common standard crossing the state line.

In 2003, reprensentatives of the National Park Service approached the Natural Resources Conservation Service to update the existing soil surveys within Arches and Canyonlands National Parks, Natural Bridges and Hovenweep National Monuments and the Orange Cliffs portion of the Glen Canyon Recreation Area. The Plan of Work and contract were approved in 2004. This application is seeking permission to carry out the field work necessary to complete the contract.

2005 Findings and Status:
No activity was conducted this report year.

3) Permit #: HOVE-2005-SCI-0003

Study Title:

VERTEBRATE SPECIES IN UTAH NATIONAL PARKS

Primary investigator contact information:

Name: Mr George Oliver, Utah Natural Heritage Program
Address: Utah Division of Wildlife Resources, 1594 W. North Temple, Salt Lake City, UT 84116-3154
Phone: 801-538-4820 **Email:** georgeoliver@utah.gov

Project Summary:

The principal purpose of this research is to increase basic knowledge and understanding of biological inventories with specific vertebrate species verification. This is one component of the biological inventories being conducted within the units of the NCPN as part of a national emphasis on inventory and monitoring within the National Park Service. Species verification will benefit the NPS and UDWR and the entire scientific community through updated information housed in the Automated National Catalog System (ANCS+), the NPS national biodiversity database, NPSpecies, and the UDWR state biodiversity database.

The purpose of the biological inventories is to document 90 percent of the vascular plant and vertebrate animal species in the units of the NCPN. Data collected from these inventories are incorporated into the national bio-diversity database, NPSpecies. In order to verify the existence of a species in a park unit, the NCPN requires a voucher specimen, a photograph, or an authoritative observation for each species listed in the database.

Species verification may be obtained from a number of sources such as NCPN inventories; existing voucher data housed in the ANCS+; from data mining efforts at other museums and herbaria; and from review of technical reports and publications. The taxonomic nomenclature associated with these verification sources is often outdated or incorrect; for example, museums may mistakenly list a particular species as collected from a Utah park, leaving the verification process in question. Once all sources have been reviewed, there are often gaps remaining in the species verification process which need to be filled.

The NPS and UDWR agree to work cooperatively toward obtaining voucher, photographic or observational data for the herpetofauna, mammalian, and avian species currently lacking complete information, and to standardize the taxonomic nomenclature for all species in the Utah units of the NCPN.

2005 Findings and Status:
Preliminary work focused on amphibians and reptiles. One species of amphibian and three species of reptiles were documented with precise geographic locations, and ecological data for these were obtained.

4) Permit #: HOVE-2005-SCI-0004

Study Title:

Sound Levels in Hovenweep National Monument

Primary investigator contact information:

Name: Skip Ambrose,
Address: HC 64 Box 2205 Castle Valley, UT 84532
Phone: 435-259-0401 or 970.227.8154 **Email:** skipambrose@frontiernet.net

Project Summary:

To determine natural ambient sound levels in the primary vegetation types in HOVE, and the relative influence of human-caused sounds on natural sound levels.

The only collections will be the collection of recorded sound data.

The National Park Service (NPS) is concerned with degradation of natural soundscapes in units of the National Park system. NPS Management Policies (4:9; 2001) states: "The National Park Service will preserve, to the greatest extent possible, the natural soundscapes of parks. Natural soundscapes exist in the absence of human-caused sound. The natural soundscape is the aggregate of all natural sounds that occur in parks, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive, and can be transmitted through air, water, or solid materials."

"Using appropriate management planning, superintendents will identify what levels of human-caused sound can be accepted within the management purposes of the parks. The frequencies, magnitudes, and durations of human-caused sound considered acceptable will vary throughout the park, being generally greater in developed areas and generally lesser in undeveloped areas. In and adjacent to parks, the Service will monitor human activities that generate noise that adversely affects park soundscapes, including noise caused by mechanical or electronic devices. The Service will take action to prevent or minimize all noise that, through frequency, magnitude, or duration, adversely affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified as being acceptable to, or appropriate for, visitor uses at the sites being monitored" (NPS 2001).

OBJECTIVES:
The objectives of this study are to:
1. Determine natural ambient sound levels in the primary habitats/acoustic zones in Hovenweep National Monument, during the summer and winter seasons; and
2. Assess the influence of man-made noise on natural ambient sound levels.

The primary objective of this project is to provide basic acoustic data necessary for preparation of a Soundscape Management Plan for Hovenweep National Monument. A secondary objective is to collect acoustic data which will be useful in assessing the influence of man-made noise on natural sounds.

2005 Findings and Status:
Acoustic monitors deployed at two locations at HOVE. No data analysis as of 12-31-2005.